Health Canada Santé Canada

Your health and safety... our priority. *Votre santé et votre sécurité... notre priorité.*

Re-evaluation Note REV2016-08

Special Review of 2,4-D: Proposed Decision for Consultation

(publié aussi en français)

31 March 2016

This document is published by the Health Canada Pest Management Regulatory Agency. For further information, please contact:

Publications
Pest Management Regulatory Agency
Health Canada
2720 Riverside Drive
A.L. 6607 D
Ottawa, Ontario K1A 0K9

Internet: pmra.publications@hc-sc.gc.ca
healthcanada.gc.ca/pmra
Facsimile: 613-736-3758
Information Service:
1-800-267-6315 or 613-736-3799
pmra.infoserv@hc-sc.gc.ca

Canada

ISSN: 1925-0630 (print)
1925-0649 (online)

Catalogue number: H113-5/2016-8E (print version)
H113-5/2016-8E-PDF (PDF version)

© Her Majesty the Queen in Right of Canada, represented by the Minister of Health Canada, 2016

All rights reserved. No part of this information (publication or product) may be reproduced or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, or stored in a retrieval system, without prior written permission of the Minister of Public Works and Government Services Canada, Ottawa, Ontario K1A 0S5.

Table of Contents

1.0 Introduction 1
2.0 Uses of 2,4-D in Canada 1
3.0 Aspect of the Pest Control Product that Prompted the Special Review 2
4.0 PMRA Evaluation of the Aspect of the Pest Control Product that Prompted the Special Review 2
4.1. Aspect of concern related to human health 2
4.2 Aspects of concern related to the environment 3
5.0 Proposed Special Review Decision for 2,4-D 5
6.0 Next Steps 5
Appendix I Registered Products Containing 2,4-D as of March 2, 2016 7
Table 1 Pest control products containing 2,4-D present as acid 7
Table 2 Pest control products containing 2,4-D as amine salt 8
Table 3 Pest control products containing 2,4-D present as choline salt 12
Table 4 Pest control products containing 2,4-D present as ester 12
References 17

1.0 Introduction

Pursuant to subsection 17(2) of the *Pest Control Products Act*, the Pest Management Regulatory Agency (PMRA) has initiated a special review of pest control products containing (2,4-dichlorophenoxy)acetic acid, commonly known as 2,4-D based on the decision taken by Norway in 2000 (Rotterdam Convention, 2001) to prohibit the use of this active ingredient due to human health and environmental concerns. The initiation of the special review for 2,4-D was announced in December 2013 (Canada, 2013a).

As required by subsection 18(4) of the *Pest Control Products Act*, the PMRA has evaluated the aspects(s) of concern related to the pest control products containing 2,4-D that prompted the special review. The aspects of concern related to the environment were identified as:

- High mobility and the potential for runoff of 2,4-D to aquatic habitats from treated areas
- The potential risk to aquatic plants following runoff.

No concerns for potential risk to aquatic organisms, other than aquatic plants, or for leaching of 2,4-D to groundwater were identified based on information provided by Norway.

In addition, with respect to effects on human health, Norway (Rotterdam Convention, 2001) concluded that "2.4-D is moderate acute toxic and irritating to eyes, but these characteristics is comparable to the alternative preparations or active substances. In addition there are some studies indicating a risk of cancer in soft tissue and lymph, but the evidence isn't strong enough to label the product for risk of cancer". Further, the Prior Informed Consent (PIC) Circular XIII (Rotterdam Convention, 2001) indicated that the expected effect of the final regulatory action in relation to human health was "reduced risk of cancer in people normally using pesticides with the agricultural needs covered by Weedar 64".

Taking into consideration that no specific concerns related to acute properties of 2,4-D were identified based on information provided by Norway, this aspect was not considered in this special review. Also, Norway made no conclusion as to the carcinogenic potential of 2,4-D, and indicated that the "evidence isn't strong enough to label the product for risk of cancer" (Rotterdam Convention, 2001). However, given that the PIC Circular XIII also indicated a reduced risk of cancer in people as an expected effect of the final regulatory action relevant to human health, the potential carcinogenicity of 2,4-D is considered as part of this special review.

2.0 Uses of 2,4-D in Canada

2,4-D, a selective systemic herbicide, is currently registered in Canada for use on turf, forests and woodlots, terrestrial feed and food crops, and industrial and domestic non-food sites. 2,4-D is present in currently registered pest control products as free acid, as amine (dimethylamine, DMA; isopropylamine, IPA; or triisopropanolamine, TIPA) or choline salts, or in ester form (2-ethylhexyl, EHE; butoxyethyl ester, BEE). All currently registered pest control products containing the above forms of 2,4-D (Appendix I) are considered in this special review.

The PMRA published the re-evaluation decision and an update for 2,4-D in 2008 and 2013, respectively (Canada, 2008; Canada, 2013b). As a result of the re-evaluation, the PMRA determined that products containing 2,4-D do not present unacceptable risks to human health and

the environment when used according to the revised conditions of use. The revised use conditions implemented as a result of the re-evaluation included discontinuation of pest control products containing the diethanolamine form of 2,4-D, removal of aquatic uses, restriction on the number of applications, and addition of buffer zones to protect the environment.

3.0 Aspect of the Pest Control Product that Prompted the Special Review

The concerns identified in the 2000 Norwegian decision to prohibit all uses of 2,4-D (Rotterdam Convention, 2001) were considered for this special review, and they were related to:

- Potential carcinogenicity of 2,4-D;
- High mobility and the potential for runoff of 2,4-D to aquatic habitats from treated areas;
- The potential risk to aquatic plants following runoff.

4.0 PMRA Evaluation of the Aspect of the Pest Control Product that Prompted the Special Review

Following the initiation of the special review of 2,4-D, the PMRA requested information from provinces and other relevant federal departments and agencies, in accordance with subsection 18(2) of the *Pest Control Products Act*. In response, water monitoring data for 2,4-D were received.

In order to evaluate the aspects of concern for 2,4-D, the PMRA has considered currently available relevant scientific information, which includes information considered for the re-evaluation of 2,4-D (Canada 2005; Canada 2006; Canada, 2007; Canada, 2008; Canada, 2013b) and any relevant information obtained since then, such as the information on Canadian incident reports, surface water monitoring data, and reviews of epidemiological studies on 2,4-D and other phenoxy herbicides available in the public domain (see Section 4.1).

4.1. Aspect of concern related to human health

Potential carcinogenicity of 2,4-D

The PMRA review of the available toxicological database for 2,4-D determined that based on in vitro and in vivo studies, all forms of 2,4-D (acid, salt, or ester forms) are not mutagenic or genotoxic and, that the overall weight of evidence indicates that 2,4-D is not carcinogenic in rats, mice, and dogs (Canada, 2007).

In addition to the toxicity studies in animals, the PMRA considered expert assessments of the evidence available from numerous epidemiological studies on 2,4-D and other phenoxy herbicides. These studies historically focused on an association between human exposure to chlorophenoxy herbicides (group of chemicals including 2,4-D and 2,4,5-trichlorophenoxyacetic acid [2,4,5-T]), and the development of two broad classes of cancer, soft-tissue sarcoma and non-Hodgkin lymphoma (NHL) in humans. Reviews of epidemiological studies available in the public domain have concluded that while some of the studies suggest a possible association between 2,4-D exposure and increase in these tumors in humans, other epidemiological studies fail to support such association (Canada, 2005; Canada, 2006, Canada, 2007; Burns and Swaen, 2012; Pahwa et al. 2012; Ntzani et al. 2013; von Stackelberg, 2013; Schinasi and Leon, 2014).

Furthermore, it was concluded that the available epidemiological studies provide equivocal or no evidence for an association between exposure to 2,4-D (and other chlorophenoxy herbicides) and other human cancers, including prostate, breast, pancreatic, colorectal, and brain cancers (Canada, 2008, Weichenthal et al., 2010; Burns and Swaen, 2012, von Stackelberg, 2013). None of the epidemiological studies relating to 2,4-D exposure in humans have been able to exclude other confounding factors, including other pesticides, contaminants, fertilizers and fuels, infectious agents, or lifestyle, that may have contributed to the etiology of reported cancer cases.

The PMRA has also considered assessments of 2,4-D exposure and human cancer conducted by other regulatory bodies (Canada, 2007) including the most recent assessment from the European Food Safety Authority (European Commission, 2014), which concluded that 2,4-D is unlikely to be carcinogenic in humans.

In addition, the PMRA considered the recent information from the International Agency for Research on Cancer (IARC) (Loomis et al., 2015), which classified 2,4-D as possibly carcinogenic to humans (IARC Monograph not available as of March 2, 2016). While, the IARC indicated that there is limited evidence in animals (due to concerns with the conduct of the positive studies) and inadequate evidence in humans for the carcinogenicity of 2,4-D, the findings that 2,4-D induces oxidative stress and causes immunosuppression were cited as the basis for the IARC hazard classification (Loomis et al., 2015). The IARC hazard classifications are not health risk assessments and the levels of human exposure, which determine the actual risk, are not taken into account in the IARC assessments.

There are no Canadian human incident reports related to the aspect of concern in the PMRA's incident report database.

Overall, taking into consideration, the inconsistent epidemiological associations, the recognition that there are many other factors that may contribute to the etiology of the reported cancer cases, information from the PMRA's incident report database, and the fact that the weight of evidence from animal studies designed to show causality did not support a carcinogenic effect, the PMRA has concluded that 2,4-D cannot be classified as a human carcinogen.

4.2 Aspects of concern related to the environment

High mobility and the potential for runoff of 2,4-D to aquatic habitats from treated areas

With respect to their behaviour in the environment, 2,4-D derivatives can be grouped into two main categories, the acid/amine group (acid, DMA, IPA, TIPA) and the ester group (EHE, BEE). 2,4-D acid and the amine forms are very soluble in water, while the ester forms are insoluble in water (Canada, 2005; Canada, 2007). Various forms of 2,4-D are non-volatile or have low volatility. The dissociation constant of 2,4-D (pKa 2.8) indicates that 2,4-D will be present in its ionic form under the pH conditions prevailing in most Canadian soils and water bodies. The amine and choline forms dissociate to the acid form in the presence of water within a few minutes.

Hydrolysis is not an important route of transformation for 2,4-D acid and the amine forms, or for the esters under acidic or neutral pH levels. However, it is an important route of transformation of the esters to the acid under alkaline pH conditions (half-lives of EHE and BEE are 2 days and

0.07 day, respectively). Phototransformation is also not an important route of transformation for 2,4-D in the environment (Canada, 2007). Aerobic biotransformation is the major route of transformation of 2,4-D in soil and water. 2,4-D acid and its derivatives are classified as non-persistent to slightly persistent in soil and water (half-lives 0.22 -31 days soil; 0.25-29 days in water). Major biotransformation products of 2,4-D are carbon dioxide (CO_2) in soil and, CO_2, 2,4-dichlorophenol (2,4-DCP) and chlorohydroquinone (CHQ) in water. Under anaerobic soil and aquatic systems, 2,4-D is considered to be persistent.

The organic carbon adsorption coefficient of 2,4-D (K_{oc} <150) indicates that 2, 4-D is weakly absorbed to soil and it is not expected to partition significantly to soil and sediment. On this basis, 2,4-D is expected to be highly mobile in soils and it is expected to runoff from the treated areas into aquatic systems following irrigation or rainfall (Canada 2005; Canada, 2007).

The potential risk to aquatic plants following runoff

To assess the potential risk to aquatic plants from runoff, the PMRA considered the surface water monitoring and modelling information as well as the toxicity to aquatic plants from exposure to 2,4-D.

The PMRA calculated the potential estimated environmental concentrations (EECs) of acid/salt and esters forms of 2,4-D in surface water using the PRZM/EXAM model or assuming a direct overspray. In addition, robust surface water monitoring data for 2,4-D from Canada and the United States were considered.

The PMRA assessed the risk to aquatic plants using the risk quotient (RQ) method which is expressed as the ratio of the EEC to the most sensitive endpoints for the different derivatives of 2,4-D for aquatic plants. The estimated risk quotient is then compared to the level of concern (LOC). For exposures to aquatic organisms, the PMRA's LOC is 1.0.

For turf uses, the calculated RQs range from 0.3 to 2.9 for the acid and amine forms, and 3.0 to 5.8 for the ester forms based on the conservative (direct overspray) EECs ranging from 0.543 to 0.788 mg a.e./L and the NOECs of 2.03 and 0.27 mg a.e./L (*Lemna gibba*) for the acid amine forms, respectively, 0.094 mg a.e./L (*Skeletonema costatum*) for EHE, and 0.20 mg a.e./L (*Lemna gibba*) for BEE.

For agriculture/non-crop/forestry uses, the calculated RQs for aquatic plants range from 0.04 to 1.4 for the acid and amine forms, 0.05 to 1.5 for EHE, and from 0.04 to 1.3 for BHE forms based on the runoff EECs ranging from 0.008 to 0.345 mg a.i./L and the static 14-day EC_{50} ($0.5 \times EC_{50}$ values used in the risk assessment) of 0.48 mg a.i./L (*Lemna gibba*) for the acid and amine forms, 0.33 mg a.i./L (*Lemna gibba*) for EHE, and 0.40 mg a.i./L (*Lemna gibba*) for BHE.

The estimated amine RQs (0.04-1.4) are representative of the risk posed by the choline form since these two forms are considered to be toxicologically equivalent.

It should be noted that the EECs were generated using conservative assumptions and, therefore, the potential risk to aquatic plants is considered unlikely. This is further supported by the available monitoring information. When the available surface water monitoring information was considered, the risk to aquatic plants was deemed to be unlikely. Based on the highest

concentration detected in Canada in urban runoff (0.0469 mg/L) and in the most recent (2002-2014) surface water monitoring (0.011 mg/L), the risk to aquatic plants from 2,4-D is not a concern.

To minimize the potential runoff from treated areas into aquatic habitats, advisory label statements are currently included on the products labels advising the users of measures that can help reduce runoff.

No concerns related to the aspect of concern (mobility and potential risk to aquatic plants following runoff) were identified in the information received through the Canadian incident report database.

Consequently, based on the results of the risk assessment and taking into consideration the current conditions of use for pest control products containing 2,4-D, the PMRA has determined that the risk to aquatic plants from 2,4-D in runoff is not of concern.

5.0 Proposed Special Review Decision for 2,4-D

Evaluation of available scientific information related to the aspects of concern for human health and the environment, indicated that the registered products containing 2,4-D are acceptable for continued registration taking into account the current conditions of use. On this basis, the PMRA is proposing to confirm the current registration of products containing 2,4-D for sale and use in Canada pursuant to subsection 21(1) of the *Pest Control Product Act*.

This proposed special review decision is a consultation document[1]. The PMRA will accept written comments on this proposal up to 45 days from the date of publication of this document. Please forward all comments to Publications (please see contact information on the cover page of this document).

6.0 Next Steps

Before making a special review decision on 2,4-D, the PMRA will consider any comments received from the public in response to this consultation document. A science-based approach will be applied in making a final decision on 2,4-D. The PMRA will then publish a special review decision document, which will include the decision, the reasons for it, a summary of the comments received on the proposed decision and the PMRA's response to these comments.

[1] "Consultation statement" as required by subsection 28(2) of the *Pest Control Products Act*.

Appendix I Registered Products Containing 2,4-D as of March 2, 2016

Table 1 Pest control products containing 2,4-D present as acid

Registration Number	Marketing Class[1]	Registrant	Product Name	Formulation	Guarantee[2]
16981	T	Dow Agrosciences Canada Inc.	2,4-Dichlorophenoxyacetic Acid Flake Technical Herbicide	Solid	97.0%
17007	T	Nufarm Agriculture Inc.	Growell 2,4-D Technical Acid	Solid	98.5%
17044	T	Nufarm Agriculture Inc.	Nufarm 2,4-D Technical Acid	Solid	98.5%
17134	T	Nufarm Agriculture Inc.	Nufarm 2,4-D Dry Powder Acid Herbicide	Solid	97.5%
17291	T	PBI/Gordon Corp	2,4-Dichlorophenoxyacetic Acid Technical	Solid	98.2%
24562	T	Nufarm Agriculture Inc.	Nufarm 2,4-D Technical Acid	Solid	96.0%
24836	T	Dow Agrosciences Canada Inc.	2,4-Dichlorophenoxyacetic Acid Molten Technical Herbicide	Solution	74.8%
27437	T	Albaugh Inc.	Albaugh 2,4-D Technical Acid Herbicide	Solid	97.63%
28491	T	Nufarm Agriculture Inc.	Nufarm 2,4-D Technical Acid Herbicide	Solid	97.0%
25783	M	Dow Agrosciences Canada Inc.	Striker Manufacturing Concentrate	Wettable Granules	FLM-9.3% DXA-50.0 % DPI-25.0%
27991	M	PBI/Gordon Corp.	Trimec DMB #2 Herbicide Powder Plus	Dust or Powder	MEP-10.20% DXA-45.59% DIC-4.30%
9342	C	Nufarm Agriculture Inc.	Nufarm Calmix Pellets Weed Killer & Soil Sterilant	Pellets	DXA-5.0% BBU-3.0%
27634	C	Dow Agrosciences Canada Inc.	Grazon Herbicide	Solution	PID-65 g/L DXA-240 g a.e./L
31641	C	Dow Agrosciences Canada Inc.	Aspect Herbicide	Solution	PID-97.5 g/L DXA-360 g a.e./L
31642	C	Dow Agrosciences Canada Inc.	Grazon XC Herbicide	Solution	PID-97.5 g/L DXA-360 g a.e./L
11852	D	Les Produits De Controle Superieur Inc./ Superior Control Products Inc.	Weedex Dandelion Bar	Solid	14.55%

Registration Number	Marketing Class[1]	Registrant	Product Name	Formulation	Guarantee[2]
21738	D	Les Produits De Controle Supericur Inc./ Superior Control Products Inc.	Weedex Dandelion Stick	Solid	6.79%

[1] T - Technical grade; M – Manufacturing concentrate; C – Commercial; D – domestic
[2] a.e. – acid equivalent; DXA - 2,4-D (present as acid); BBU – Bromacil; DPI - Clopyralid; DIC - Dicamba; FLM - Flumetsulam; MEP - Mecoprop-P; PID – Picloram;

Table 2 Pest control products containing 2,4-D as amine salt

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
16988	M	Dow Agrosciences Canada Inc.	2,4-D DMA 720 Unsequestered Weed Killer	Solution	55.7%
17107	M	Dow Agrosciences Canada Inc.	2,4-D DMA 720 Sequestered Weed Killer	Solution	55.5%
17138	M	Nufarm Agriculture Inc.	Nufarm 2,4-D Amine Unsequestered Manufacturing Concentrate	Solution	683 g a.e./L
17401	M	Nufarm Agriculture Inc.	Nufarm 2,4-D DMA Manufacturing Concentrate	Solution	720 g a.e./L
18352	M	Nufarm Agriculture Inc.	Growell 2,4-D Dimethylamine Salt 720 Formulation	Solution	720 g a.e./L
19530	M	Dow Agrosciences Canada Inc.	2,4-D Isopropylamine Salt	Solution	39.4%
27165	M	Nufarm Agriculture Inc.	Growell 2,4-D Dimethylamine Salt 683 Formulation	Solution	683 g a.e./L
27721	M	Scotts Canada Ltd.	Killex 3x Manufacturing Concentrate Ii	Solution	MEQ-157.5 g a.e./L DXB-285 g a.e./L DIC-27 g a.e./L
27808	M	Interprovincial Cooperative Limited	IPCO 2,4-D/ Mecoprop-P Formula 3 XP	Solution	MEQ-180 g a.e./L DXB-360 g a.e./L
27867	M	Loveland Products Canada Inc.	Mecoprop-P + 2,4-D Manufacturing Concentrate	Solution	MEQ-180 g a.e./L DXB-360 g a.e./L
5931	C	Loveland Products Canada Inc.	2,4-D Amine 600 Herbicide	Solution	564 g a.e./L
9007	C	Dow Agrosciences Canada Inc.	Tordon 101 Herbicide	Solution	PID-65 g /L DXB-240 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
9528	C	Dow Agrosciences Canada Inc.	2,4-D Amine 500 Herbicide	Solution	470 g a.e./L
14167	C	Dow Agrosciences Canada Inc.	Tordon 202c Liquid Herbicide	Solution	PID-12 g/L DXB-200 g a.e./L
14725	C	Nufarm Agriculture Inc.	Nufarm 2,4-D Amine 500 Liquid Herbicide	Solution	470 g a.e./L
14726	C	Nufarm Agriculture Inc.	Nufarm 2,4-D Amine 600 Liquid Herbicide	Solution	564 g a.e./L
15730	C	Agrium Advanced Technologies RP Inc.	Wilson 2,4-D Amine 500 Liquid Weed Killer	Solution	470g a.e./L
17511	C	Interprovincial Cooperative Limited	IPCO 2,4-D Amine 600 Liquid Herbicide	Solution	560 g a.e./L
19536	C	Monsanto Canada Inc.	Rustler Summerfallow Herbicide	Solution	GPI-108 g a.e./L DXB-182 g a.e./L
25898	C	Monsanto Canada Inc.	Mon 77790 Herbicide	Solution	GPI-132 g a.e./L DXB-82 g a.e./L
26163	C	Interprovincial Cooperative Limited	Weedaway 2,4-D Amine 600 Liquid Herbicide	Solution	560 g a.e./L
26649	C	Dow Agrosciences Canada Inc.	Ram Herbicide	Solution	PID-65 g a.e./L DXB-240 g a.e./L
27779	C	Interprovincial Cooperative Limited	IPCO Premium 2-Way XP Turf Herbicide Liquid	Solution	MEQ-200g a.e./L DXB-200g a.e./L
27846	C	Interprovincial Cooperative Limited	IPCO Premium 3-Way XP Herbicide	Solution	MEQ-100g a.e./L DXB-190g a.e./L DIC-18g a.e./L
27848	C	Interprovincial Cooperative Limited	Weedaway Premium 3-Way XP Turf Herbicide	Solution	MEQ-100g a.e./L DXB-190g a.e./L DIC-18g a.e./L
27856	C	Basf Canada Inc.	Dyvel DSP Liquid Herbicide	Solution	MEQ-80g a.e./L DXB-295g a.e./L DIC-110g a.e./L
27884	C	Loveland Products Canada Inc.	Par III Turf Herbicide	Solution	MEQ-100g a.e./L DXB-190g a.e./L DIC-18g a.e./L
27972	C	Nufarm Agriculture Inc.	Nufarm Trillion Turf Herbicide	Solution	MEQ-100g a.e./L DXB-190g a.e./L DIC-18g a.e./L
27969	C	Agrium Advanced Technologies RP Inc.	Wilson Turf Rite 2+2 Double Strength Herbicide	Solution	DXB-200 g a.e./L MEQ-200 g a.e./L
27970	C	Agrium Advanced Technologies RP Inc.	Pro Tri-Kil Turf Herbicide	Solution	MEQ-100 g a.e./L DXB-190 g a.e./L DIC-18 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
27972	C	Nufarm Agriculture Inc.	Nufarm Trillion Turf Herbicide	Solution	MEQ-100 g a.e./L DXB-190 g a.e./L DIC-18 g a.e./L
27975	C	Scotts Canada Ltd.	Green Cross Killex 500 Liquid Turf Herbicide Concentrate	Solution	MEQ-75.0g a.e./L DXB-385.25g a.e./L DIC-18.75g a.e./L
27976	C	Scotts Canada Ltd.	Green Cross Killex Liquid Turf Herbicide Concentrate	Solution	MEQ-100g a.e./L DXB-190g a.e./L DIC-18g a.e./L
27987	C	Syngenta Canada Inc.	Target Ds Liquid Herbicide	Solution	MEQ-80g a.e./L DXB-295g a.e./L DIC-110g a.e./L
28271	C	Dow Agrosciences Canada Inc.	2,4-D Amine 600 Herbicide	Solution	564g a.e./L
28295	C	Dow Agrosciences Canada Inc.	Formula 40F Herbicide	Solution	470g a.e./L
28296	C	Dow Agrosciences Canada Inc.	Formula 40C Herbicide	Solution	470g a.e./L
28552	C	Dow Agrosciences Canada Inc.	Restore B Herbicide (A Component Of Restore Herbicide)	Solution	564g a.e./L
29248	C	Interprovincial Cooperative Limited	Viterra 2,4-D Amine 600 Liquid Herbicide	Solution	560g a.e./L
30532	C	Intelligro	Civitas Weedfree Brand Concentrate	Emulsifiable Concentrate Or Emulsion	MEQ-4.04g a.e./L DXB-6.33g a.e./L DIC-0.78g a.e./L
30632	C	Dow Agrosciences Canada Inc.	Restore II Herbicide	Solution	DXB-400g a.e./L AMD-50.0g a.e./L
31332	C	Albaugh Inc.	Albaugh 2,4-D Amine 600	Solution	560g a.e./L
27799	D	Scotts Canada Ltd.	Ortho Killex Ready-To-Use Lawn Weed Control Herbicide With Quick Connect Sprayer	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
27800	D	Scotts Canada Ltd.	Ortho Killex Ready-To-Use Lawn Weed Control Herbicide	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
27801	D	Scotts Canada Ltd.	Ortho Killex Lawn Weed Control Concentrate	Solution	MEQ-52.52g a.e./L DXB-95g a.e./L DIC-9g a.e./L
27809	D	Scotts Canada Ltd.	Ortho Killex Ready-To-Spray Lawn Weed Control	Solution	MEQ-52.52 g a.e./L DXB-95 g a.e./L DIC-9 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
27811	D	Scotts Canada Ltd.	Ortho Killex With Pull N' Spray Applicator Ready-To-Use	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
27914	D	Interprovincial Cooperative Limited	Co-Op Premium Spot Weed Killer XP Herbicide	Solution	MEQ-1.00 g a.e./L DXB-1.90 g a.e./L DIC-0.18 g a.e./L
27915	D	Interprovincial Cooperative Limited	Co-Op Premium Lawn Weed Killer XP Herbicide	Solution	MEQ-50 g a.e./L DXB-95 g a.e./L DIC-9 g a.e./L
27974	D	Sure-Gro IP Inc.	Wilson Lawn Weedout Ready To Use	Solution	MEQ-3.0 g a.e./L DXB-3.0 g a.e./L DIC-0.3 g a.e./L
28000	D	Sure-Gro IP Inc.	Wilson Lawn Weedout (2) Ready To Use	Solution	MEQ-3.0 g a.e./L DXB-3.0 g a.e./L DIC-0.3 g a.e./L
28078	D	Sure-Gro IP Inc.	Wilson Lawn Weedout Attach & Spray Concentrate	Solution	MEQ-25 g a.e./L DXB-50 g a.e./L DIC-4.5 g a.e./L
28081	D	Sure-Gro IP Inc.	Wilson Lawn Weedout Concentrate	Solution	MEQ-50 g a.e./L DXB-95 g a.e./L DIC-9 g a.e./L
28204	D	Les Produits De Controle Superieur Inc/ Superior Control Products Inc.	Concentrated Weedex Weed Control For Lawns II	Solution	MEQ-50 g a.e./L DXB-95.0 g a.e./L DIC-9 g a.e./L
28209	D	Les Produits De Controle Superieur Inc/ Superior Control Products Inc.	Ready To Use Weedex Weed Control For Lawns II	Solution	MEQ-1.0 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
28310	D	Scotts Canada Ltd.	Ortho Killex Ready-To-Use Herbicide II	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
28311	D	Scotts Canada Ltd.	Ortho Killex With Pull'n Spray Applicator Ready-To-Use Herbicide II	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
28312	D	Scotts Canada Ltd.	Ortho Killex Lawn Weed Control Ready-To-Use Herbicide II	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
28374	D	Scotts Canada Ltd.	Ortho Killex Ready-To-Use Herbicide	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
28513	D	Les Produits De Controle Superieur Inc./ Superior Control Products Inc.	Ready To Use Weedex With 1 Touch Power Sprayer	Solution	MEQ-1.0 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
30536	D	Intelligro	Clear Choice(Tm) Ready-To-Use Selective Herbicide	Emulsifiable Concentrate	MEQ-0.30 g a.e./L DXB-0.47 g a.e./L DIC-0.058 g a.e./L
30541	D	Scotts Canada Ltd.	Ortho® Killex® Ready-To-Use With Wand Applicator	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
31028	D	Sure-Gro IP Inc.	Smartones Lawn Weeder	Solution	MEQ-1.0 g a.e./L DXB-1.90 g a.e./L DIC-0.18 g a.e./L

[1] T - Technical grade –, M – Manufacturing concentrate; C – Commercial; D – domestic
[2] a.e. – acid equivalent; DXB - 2,4-D (present as amine salts: dimethylamine salt, diethanolamine salt, or other amine salts); AMD – Aminopyralid; DIC – Dicamb); GPI – Glyphosate; MEQ – Mecoprop-p-dimethylammonium; PID – Picloram;

Table 3 Pest control products containing 2,4-D present as choline salt

Registration Number	Marketing Class[1]	Registrant	Product Name	Formulation	Guarantee[2]
30956	M	Dow Agrosciences Canada Inc.	GF-2668 Manufacturing Concentrate	Solution	44.5%
30957	C	Dow Agrosciences Canada Inc.	GF-2654 TC Herbicide	Solution	456 g a.e./L
30958	C	Dow Agrosciences Canada Inc.	Enlist Duo Herbicide	Solution	GPX-204 g a.e./L DXJ-194 g a.e./L
30959	C	Dow Agrosciences Canada Inc.	GF-2654 Tsoy Herbicide	Solution	456 g a.e./L
30960	C	Dow Agrosciences Canada Inc.	FGf-2726 Tsoy Herbicide	Solution	GPX-204 g a.e./L DXJ-194 g a.e./L

[1] M – Manufacturing concentrate; C – Commercial
[2] a.e. – acid equivalent; DXJ – 2,4-D (present as choline salt); GPX – Glyphosate

Table 4 Pest control products containing 2,4-D present as ester

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
16982	T	Dow Agrosciences Canada Inc.	Dow 2,4-D 2-Ethylhexyl Ester	Emulsifiable Concentrate Or Emulsion	63.9% a.e.
16990	T	Dow Agrosciences Canada Inc.	2,4-D Butoxy Ethanol Esters	Liquid	66.4% a.e.
17012	T	Nufarm Agriculture Inc.	Growell 2,4-D 2-Ethylhexyl Ester Technical	Solution	64.0% a.e.
17135	T	Nufarm Agriculture Inc.	Nufarm 2,4-D 2-Ethylhexyl Ester Technical	Liquid	64.3% a.e.
27263	T	Nufarm Agriculture Inc.	Nufarm 2,4-D 2-Ethylhexyl Ester Technical	Emulsifiable Concentrate	64.0% a.e.
28490	T	Nufarm Agriculture Inc.	Nufarm 2,4-D 2-Ethylhexyl Ester Technical Herbicide	Emulsifiable Concentrate	63.9%

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
29964	T	Albaugh Inc.	Albaugh 2,4-D 2-Eh Ester Technical	Liquid	62.12% a.e.
15981	R	Dow Agrosciences Canada Inc.	Esteron Herbicide	Emulsifiable Concentrate	564 g a.e./L
27818	C+R	Loveland Products Canada Inc.	Salvo 2,4-D Ester 700 Herbicide	Emulsifiable Concentrate	660 g a.e./L
27819	C+R	Interprovincial Cooperative Limited	IPCO 2,4-Dester 700 Herbicide	Emulsifiable Concentrate	660 g a.e./L
27820	C+R	Nufarm Agriculture Inc.	Nufarm 2,4-D Ester 700 Liquid Herbicide	Emulsifiable Concentrate	660 g a.e./L
29007	C+R	Interprovincial Cooperative Limited	Weedaway 2,4-D Ester 700 Herbicide	Emulsifiable Concentrate	660 g a.e./L
29264	C+R	Dow Agrosciences Canada Inc.	2,4-D LV-700 Herbicide	Emulsifiable Concentrate	660 g a.e./L
31698	C+R	Adama Agricultural Solutions Canada Ltd.	Adama 2,4-D Ester 700 Liquid Herbicide	Emulsifiable Concentrate	660 g a.e./L
6330	C	Dow Agrosciences Canada Inc.	2,4-D Bee-4 Herbicide	Emulsifiable Concentrate	500 g a.e./L
9560	C	Dow Agrosciences Canada Inc.	2,4-D LV-600 Herbicide	Emulsifiable Concentrate	564 g a.e./L
15027	C	Nufarm Agriculture Inc.	Nufarm Desormone Liquid Herbicide	Emulsifiable Concentrate	DXF-330 g a.e./L DIH-350 g a.e./L
20310	C	Interprovincial Cooperative Limited	IPCO 2,4-D Ester 700 Low Volatile Liquid Herbicide	Emulsifiable Concentrate	660 g a.e./L
22659	C	Bayer Cropscience Inc.	Thumper Emulsifiable Selective Weedkiller	Emulsifiable Concentrate	DXF-280 g a.e./L BRY-280 g a.e./L
24833	C	Dow Agrosciences Canada Inc.	Attain B Herbicide (A Component of Attain Herbicide Tank Mix)	Emulsifiable Concentrate	564 g a.e./L
27243	C	Dow Agrosciences Canada Inc.	Frontline 2,4-D B Emulsifiable Concentrate Herbicide (A Component of Frontline 2,4-D Herbicide Tank Mix)	Emulsifiable Concentrate	564 g a.e./L
27879	C	Basf Canada Inc.	Adrenalin SC Herbicide	Emulsifiable Concentrate	IMZ-20 g a.e./L DXF-560 g a.e./L
27966	C	Interprovincial Cooperative Limited	IPCO Dichlorprop-D Herbicide	Emulsifiable Concentrate	DXF-282 g a.e./L DIH-300 g a.e./L
27967	C	Loveland Products Canada Inc.	Turboprop	Emulsifiable Concentrate	DXF-282 g a.e./L DIH-300 g a.e./L
28123	C	Nufarm Agriculture Inc.	Approve Herbicide	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L
28779	C	Adama Agricultural Solutions Canada Ltd.	Thrasher	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L
28853	C	Interprovincial Cooperative Limited	IPCO Leader Liquid Herbicide	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
28947	C	Interprovincial Cooperative Limited	IPCO Leader 450 Liquid Herbicide	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L
29513	C	Bayer Cropscience Inc.	Thumper Total 2 Herbicide (A Component of Thumper Total Herbicide Tank Mix)	Emulsifiable Concentrate	DXF-280 g a.e./L BRY-280 g a.e./L
29660	C	Nufarm Agriculture Inc.	Nufarm Estaprop XT Liquid Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
29663	C	Nufarm Agriculture Inc.	Desormone XT Liquid Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
29664	C	Interprovincial Cooperative Limited	IPCO Dichlorprop-DX Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
29750	C	Dow Agrosciences Canada Inc.	Reclaim B Herbicide	Emulsifiable Concentrate	564 g a.e./L
29972	C	Dow Agrosciences Canada Inc.	Attain XC B Herbicide	Emulsifiable Concentrate	660 g a.e./L
29979	C	Albaugh Inc.	Agri Star 2,4-D Ester 700	Emulsifiable Concentrate	660 g a.e./L
30005	C	Interprovincial Cooperative Limited	Weedaway Leader Herbicide	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L
30061	C	Dow Agrosciences Canada Inc.	Frontline 2,4-D Xc B Herbicide (A Component of Frontline 2,4-D XC Herbicide)	Emulsifiable Concentrate	660.0 g a.e./L
30063	C	Dow Agrosciences Canada Inc.	Reclaim Ii B Herbicide (A Component of Reclaim II Herbicide)	Emulsifiable Concentrate	660 g a.e./L
30077	C	Dow Agrosciences Canada Inc.	Octtain XL Herbicide	Emulsifiable Concentrate	FLR-90 g a.e./L DXF-360 g a.e./L
30103	C	Interprovincial Cooperative Limited	Dichlorprop-DX Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
30111	C	Interprovincial Cooperative Limited	Weedaway Dichlorprop-DX Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
30112	C	Interprovincial Cooperative Limited	Viterra Dichlorprop-DX Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
30372	C	Adama Agricultural Solutions Canada Ltd.	Thrasher II	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L
30460	C	Newagco Inc.	Mpower 2,4-D Ester 700	Emulsifiable Concentrate	660 g a.e./L
30690	C	Nufarm Agriculture Inc.	Enforcer D Herbicide	Emulsifiable Concentrate	FLR-80 g a.e./L DXF-240 g a.e./L BRY-190 g a.e./L
31626	C	Dow Agrosciences Canada Inc.	Scuttle Herbicide	Emulsifiable Concentrate	FLR-90 g a.e./L DXF-360 g a.e./L
31673	C	Syngenta Canada Inc.	Traxos®Two Broadleaf Component	Emulsifiable Concentrate	FLR-90 g a.e./L DXF-360 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
32111	C	Nufarm Agriculture Inc.	Blackhawk herbicide	Emulsifiable Concentrate	DXF 473 g a.e./L PFE 6.1 g/L

[1] T – Technical grade; M – Manufacturing concentrate; R – Restricted; C + R – Commercial plus Restricted uses; C – Commercial
[2] a.e. – acid equivalent; DXF – 2,4-D (present as low volatile esters); BRY – Bromoxynil; DIH – Dichlorprop; DPZ - Dichlorprop-P-2-ethylhexyl; FLR- Fluroxypyr; IMZ – Imazamox; PFE - Pyraflufen-ethyl

References

Published Information

PMRA Number	Reference
1011609	Canada, 2005. Pest Management Regulatory Agency Regulatory. Proposed Acceptability for Continuing Registration PACR2005-01, *Re-evaluation of the Lawn and Turf Uses of (2,4-Dichlorophenoxy)acetic Acid[2,4-D]*
1293704	Canada, 2006. Pest Management Regulatory Agency Regulatory. Re-evaluation Note REV2006-11, *Lawn and Turf Uses of (2,4-Dichlorophenoxy)acetic Acid [2,4-D]: Interim Measures*
1434680	Canada, 2007. Pest Management Regulatory Agency Regulatory. Proposed Acceptability for Continuing Registration PACR 2007-06, *Re-evaluation of the Agricultural, Forestry, Aquatic and Industrial Site Uses of (2,4-Dichlorophenoxy)acetic Acid [2,4-D]*
1604212	Canada, 2008. Pest Management Regulatory Agency Regulatory. Re-evaluation Decision, RVD2008-11, *(2,4-Dichlorophenoxy)acetic Acid [2,4-D], 16 May 2008*
2405939	Canada, 2013a. Pest Management Regulatory Agency Regulatory Note REV2013-06, Special Review Initiation of 23 Active Ingredients
2254850	Canada, 2013b. Pest Management Regulatory Agency Regulatory. Re-evaluation Note, REV2013-02, *Re-evaluation update 2,4-D*
2617375	European Commission, 2014. Conclusion on the peer review of the pesticide risk assessment of the active substance 2,4-D. EFSA Journal 12(9):3812
2617381	Rotterdam Convention, 2001. PIC Circular XIII. June 2001
2627416	Loomis D., Guyton K., Grosse Y., El Ghissassi F., Bouvard V. 2015. Carcinogenicity of lindane, DDT, and 2,4-dichlorophenoxyacetic acid. *Lancet Oncology* Vol. 16: 891-892
2617383	United States, 2014. Response to Public Comments Received Regarding New Uses of Enlist DuoTM on Corn and Soybeans. United States Environmental Protection Agency, Office of Chemical Safety and Pollution Prevention, October 2014.
2617376	Burns C.J. and Swaen G.M.H (2012) Review of 2,4-dichlorophenoxyacetic acid (2,4-D) biomonitoring and epidemiology. Crit. Rev. Toxicol. 42(9):768-786
2617379	Ntzani EE, Chondrogiorgi M, Ntritsos G, Evangelou E, Tzoulaki I, 2013. Literature review on epidemiological studies linking exposure to pesticides and health effects. EFSA supporting publication 2013: EN-497, 159 pp. Available online: www.efsa.europa.eu/publications
2617380	Pahwa M., Harris S.A., Hohenadel K., McLaughlin J.R., Spinelli J.J., Pahwa P., Dosman J.A., and Blair A. (2012) Pesticide use, immunologic conditions, and risk of non-Hodgkin lymphoma in Canadian men in six provinces. Int. J. Cancer 131:2650-2659
2617382	Schinasi L. and Leon M.E. (2014) Non-Hodgkin lymphoma and occupational exposure to agricultural pesticide chemical groups and active ingredients: a systemic review and meta-analysis. Int. J .Environ. Res. Pub Health 11:4449-4527
2617384	von Stackelberg K. (2013) A systemic review of carcinogenic outcomes and potential mechanisms from exposure to 2,4-D and MCPA in the environment. J. Toxicol. 2013: 1-53
2617385	Weichenthal S., Moase C., and Chan P. (2010) A review of pesticide exposure and cancer incidence in the agricultural health study cohort. Environ. Health Persp. 118: 1117-1125
1307560	Struger, J, T. Fletcher And G. Gris, 2004, Occurrence Of Pesticides In The Don And Humber River Watersheds (1998 - 2002), Interm Report, Environment Canada, Ontario Ministry Of The Environment And The City Of Toronto, DACO: 8.6

PMRA Number	Reference
1311123	2005, Direction Du Suivi De L'etat De L'environnement; Developpement Durable, Environnement Et Parcs Quebec, Les Pesticides Utilises Dans Les Espaces Verts Urbains; Presence Dans L'eau Des Rejets Urbains Et Dans L'air Ambiant, Blibiotheque national du Quebec, ISBN 2-550-44907-X, Envirodoq No ENV/2005/0165, DACO: 8.6
1311142	Byrtus Gary et al., 2004, Alberta Environment, Environmental Assuarane Service, A Summary Of Pesticide Residues From The Alberta Treated Water Survey, 1995 - 2003., A Summary Of Pesticide Residue Data, Alberta Environment, Environmental Assurance Service, DACO: 8.6
1311143	Alberta Environment, Environmental Assurance Service, A Summary Of Pesticide Residues From The Alberta Treated Water Survey, 1995 - 2003. Raw Data, DACO: 8.6
1398444	Les pesticides en milieu agricole: etat de la situation environnementale et initiatives prometteuses. Direction des politiques en milieu terrestre, Service des pesticides, Ministere du Developpement durable, de l'Environnement et des Parcs, Quebec. http://www.mddep.gouv.qc.ca/pesticides/etat-env/etat-env.pdf, DACO: 8.6
1398451	Giroux, I. et al, 2006, Ministere du Developpement durable, de l'Environnement et des Parcs, Direction du suivi de l'etat de l'environnement, Direction des politiques de l'eau et Centre d'expertise en analyse environnementale du Quebec., Part 1: La presence de pesticides dans l'eau au Quebec, Bilan dans les cours d'eau de zones en culture de mais et de soya en 2002, 2003 et 2004 et dans les reseaux de distribution d'eau potable., http://www.mddep.gouv.qc.ca/pesticides/mais_soya/index.htm, DACO: 8.6
1398452	Giroux, I. et al, 2006, Part 2: La presence de pesticides dans l'eau au Quebec, Bilan dans les cours d'eau de zones en culture de mais et de soya en 2002, 2003 et 2004 et dans les reseaux de distribution d'eau potable. Ministere du Developpement durable, de l'Environnement et des Parcs, Direction du suivi de l'etat de l'environnement, Direction des politiques de l'eau et Centre d'expertise en analyse environnementale du Quebec., http://www.mddep.gouv.qc.ca/pesticides/mais_soya/index.htm, DACO: 8.6
1398453	Giroux, I. et al, 2006, Part 3: La presence de pesticides dans l'eau au Quebec, Bilan dans les cours d'eau de zones en culture de mais et de soya en 2002, 2003 et 2004 et dans les reseaux de distribution d'eau potable. Ministere du Developpement durable, de l'Environnement et des Parcs, Direction du suivi de l'etat de l'environnement, Direction des politiques de l'eau et Centre d'expertise en analyse environnementale du Quebec., http://www.mddep.gouv.qc.ca/pesticides/mais_soya/index.htm, DACO: 8.6
1723616	Giroux, I., 2007, Giroux, I. 2007. Les pesticides dans quelques tributaires de la rive nord du Saint-Laurent: Riviere L'Assomption, Bayonne, Maskinonge et du Loup. Ministere du Developpement durable, de l'Environnement et des Parcs. Direction du suivi de l'etat de l'environnement. DACO: 8.6
1723625	Marchand, S. and R. Asselin., 2006, Marchand, S. and R. Asselin. 2006. Caracterisation des effluents des fermes de canneberges. Club d'encadrement technique Atocas Quebec (CETAQ), ministere de l'Agriculture, des Pecheries et de l'Alimentation, Direction regionale du Centre-du-Quebec. 68 p., DACO: 8.6
1739314	Harris, K. A, et al., 2008, Partitioning of Current-use and Legacy Pesticides in Salmon Habitat in British Columbia, Canada. Environmental Toxicology and Chemistry 27(11): 2253-2262., DACO: 8.6
1758182	Donald, D.B., Cessna, A.J., Sverko, E., Glozier, N.E., 2007, Pesticides in surface drinking-water supplies of the Northern Great Plains. This is a summary of Pesticide Science Fund data. Environment Canada, Agriculture and Agri-Food Canada, Environmental Health Perspectives, VOLUME 115, NUMBER 8, August 2007, DACO: 8.6
2505828	United States Department of Agriculture (USDA). 2013 Pesticide Data Program Annual Summary, Calendar Year 2013, Science and Technology Programs, USDA, DACO: 8.6, DACO: 8.6

PMRA Number	Reference
2505827	United States Department of Agriculture (USDA). 2012. Pesticide Data Program Annual Summary, Calendar Year 2012, Science and Technology Programs, USDA, DACO: 8.6
2312780	United States Department of Agriculture (USDA). 2013. Pesticide Data Program Annual Summary, Calendar Year 2011. Science and Technology Programs, USDA. February 2013., DACO: 8.6
2312778	United States Department of Agriculture (USDA). 2012. Pesticide Data Program Annual Summary, Calendar Year 2010. Science and Technology Programs, USDA. May 2012., DACO: 8.6
2312776	United States Department of Agriculture (USDA). 2011. Pesticide Data Program Annual Summary, Calendar Year 2009. Science and Technology Programs, USDA. May 2011., DACO: 8.6
1852614	United States Department of Agriculture (USDA). 2009. Pesticide Data Program Annual Summary, Calendar Year 2008. Science and Technology Programs, USDA. December 2009., DACO: 8.6
1774484 1957282	Pesticide Data Program Annual Summary, Calendar Year 2007. United States Department of Agriculture (USDA), Science and Technology Programs., USDA 2007. Science and Technology Programs. United States Department of Agriculture., DACO: 8.6
1852619	United States Department of Agriculture (USDA). 2007. Pesticide Data Program Annual Summary, Calendar Year 2006. Science and Technology Programs,Agricultural Marketing Service, USDA. December 2007., DACO: 8.6
1852618	United States Department of Agriculture (USDA). 2006. Pesticide Data Program Annual Summary, Calendar Year 2005. Science and Technology Programs, Agricultural Marketing Service, USDA. November 2006., DACO: 8.6
1852616	United States Department of Agriculture (USDA). 2006. Pesticide Data Program Annual Summary, Calendar Year 2004. Science and Technology Programs, Agricultural Marketing Service, USDA. February 2006., DACO: 8.6
1857388	United States Department of Agriculture (USDA). 2005. Pesticide Data Program Annual Summary, Calendar Year 2003. Science and Technology Programs, Agricultural Marketing Service, USDA. June 2005., DACO: 8.6
1857396	United States Department of Agriculture (USDA). 2004. Pesticide Data Program Annual Summary, Calendar Year 2002. Science and Technology Programs, Agricultural Marketing Service, USDA. February 2004., DACO: 8.6
2035772	Pesticides dans l'eau de surface d'une zone maraichere Ruisseau Gibeault-Delisle dans les « terres noires » du bassin versant de la riviere chateauguay de 2005 a 2007 Juin 2010, DACO: 8.6
2102602	Giroux, I., 2010, Presence de pesticides dans l'eau au Quebec - Bilan dans quatre cour d'eau de zones en culture de mais et de soya en 2005, 2006 et 2007 et dans des reseaux de distribution d'eau potable, DACO: 8.6
2306368	Giroux, I. and L. Pelletier, Presence de pesticides dans l'eau du Quebec : bilan dans quatre cours d'eau de zones en culture de mais et de soya en 2008, 2009 et 2010, DACO: 8.6
2428525	Todd, A. and J. Struger. 2014. Changes in acid herbicide concentrations in urban streams after a cosmetic pesticides ban. Challenges 5:138-151, DACO: 8.6
2506289	Woudneh, M.B. et. Al., 2007.Acidic herbicides in surface waters of Lower Fraser Valley, British Columbia, Canada Journal Of Chromatography A,1139, 121-129., DACO: 8.6

Unpublished Information

PMRA Number	Reference
2617378	Norway, 1991. Ecotoxicological Documentation 2,4-D-Di-Salt, November 1991
2617400	Norway, 1997. Minute book, Board of Pesticides (Rådet for plantevernsmidler): Case 16/97: Weedar 64- 2,4 D, application for renewed approval, File no. 33/96
2617377	Rotterdam Convention. Form for Notification of the Final Regulatory Action to Ban or Severely Restrict a Chemical. Country: Norway.
1311107	Unpublished water monitoring data collected in reservoirs of the Prairie Region (2003 - 2004). Pesticide Science Fund.,DACO: 8.6
1311110	Environment Canada, Presence, Levels and Relative Risks of Priority Pesticides in selected Canadian aquatic ecosystems: an Environment Canada Pesticides Science Fund Project. year 1 (2003-04) Annual Report, DACO: 8.6
1311111	Environment Canada, Unpublished Pesticide Science Fund Annual Report 2004-2005. (water, air, plants, mammals and amphibians; and fish and birds)., DACO: 8.6
1311112	Environment Canada, Unpublished National Water Monitoring Data. Pesticide Science Fund (2004)., DACO: 8.6
1311116	Environment Canada, Unpbulished Water Monitoring Data collected in Wetlands of the Prairie Region (2004). Pesticide Science Fund, DACO: 8.6
1311131	Manitoba Water Stewardship, Unpublished Water Monitoring Data from Manitoba (2001 - 2003), DACO: 8.6
1357366	Unpublished Water Monitoring Data Collected from Great Lakes Area of Concern and Small Streams in the Niagara and Burlington Area (2003). Part of the Pesticide Science Fund., DACO: 8.6
1357367	Unpublished Water Monitoring Data Collected from Great Lakes Area of Concern (2004). Part of the Pesticide Science Fund., DACO: 8.6
1357368	Unpublished Water Monitoring Data Collected from Great Lakes Area of Concern and Great Lakes Connecting Channels (2002), DACO: 8.6
1357369	Unpublished Water Monitoring Data Collected From Lake Huron Tributaries (2002), DACO: 8.6
1398447	Unpublished Water and Suspended Sediment Monitoring Data from the Peel River Yukon/NWT, DACO: 8.6
1403269	Environment Canada, Pesticide Science Fund Annual Report 2005-2006., DACO: 8.6
1560632	Pesticide Sampling Program for Selected Municipal Drinking Water Supplies in New Brunswick.: Tables 4-6: Results by Municipality and QA/QC Samples DACO: 8.6
1703707	Environment Canada (2008) Unpublished water monitoring data on 2,4-DB, (2002-2006), provided by Environment Canada, Ontario Region., DACO: 8.6
1726638	Pesticide Science Fund Annual Report 2006-2007; DACO: 8.6, 9.9
1726642	Pesticide Science Fund Annual Report 2007-2008; DACO 8.6
1971119	Raw Unpublished Pesticide Science Fund Water Monitoring from Mill Creek British Columbia, DACO: 8.6
2170918	Nova Scotia Department of the Environment. (2009). Unpublished municipal groundwater monitoring data. Received June 2011, Nova Scotia Department of the Environment. (2009). Unpublished municipal groundwater monitoring data. Received June 2011., DACO: 8.6

PMRA Number	Reference
2171036	Ontario Ministry of the Environment. (2010). Unpublished groundwater monitoring data from Ontario's Provincial Groundwater Monitoring Network. Received September 2011., DACO: 8.6
2149078	Elliott, J. et al., 2011, (2010). Groundwater vulnerability to pesticide contamination in the Assiniboine Delta Aquifer. Environment Canada Pesticide Science Fund, DACO: 8.6
2408645	Saskatchewan Water Security Agency. 2014. Water monitoring data on 2,4-D submitted following the PMRA's February 2014 monitoring data request for active ingredients under special review. Data submitted February 27, 2014. Government of Saskatchewan, DACO: 8.6
2408702	Government of Alberta. 2014. Monitoring data for 2.4-D in Alberta's treated water supply shared by Health Canada's Water Quality & Science Bureau following the PMRA's February 2014 monitoring data request for active ingredients under special review. Data submitted February 19, 2014, DACO: 8.6
2408703	Government of New Brunswick. 2014. Report on 2,4-D in New Brunswick municipal drinking water sources shared by Health Canada's Water Quality & Science Bureau following the PMRA's February 2014 monitoring data request for active ingredients under special review. Report submitted February 19, 2014, DACO: 8.6
2408707	Government of Quebec. 2014. Monitoring data on 2,4-D in drinking water supplies in Quebec shared by Health Canada's Water Quality & Science Bureau following the PMRA's February 2014 monitoring data request for active ingredients under special review. Report submitted February 19, 2014, DACO: 8.6
2408708	Government of Saskatchewan. 2014. Monitoring data on 2,4-D in drinking water supplies in Saskatchewan shared by Health Canada's Water Quality & Science Bureau following the PMRA's February 2014 monitoring data request for active ingredients under special review. Report submitted February 19, 2014, DACO: 8.6
2413008	MDDEPF. 2014. Monitoring data on 2,4-D in surface water and groundwater submitted following the PMRA's February 2014 monitoring data request for active ingredients under special review. Data submitted April 15, 2014. Banque de donnees sur la qualite du milieu aquatique (BQMA), Quebec, ministere du Developpement durable, de l'Environnnement, de la Faune et des Parcs. Direction du suivi de l'etat de l'environnement, DACO: 8.6
2413013	MDDEFP. 2014. Monitoring data on 2,4-D (and other pesticides) in raw surface water prior to entry in drinking water treatment station and in treated water submitted following the PMRA's February 2014 monitoring data request for active ingredients under special review. Data submitted April 15, 2014. Banque de donnees sur la qualite du milieu aquatique (BQMA), Quebec, ministere du Developpement durable, de l'Environnement, de la Faune et des Parcs. Direction du suivi de l'etat de l'environnement, DACO: 8.6
2413016	MDDEPF. 2014. Monitoring data on 2,4-D in drinking water submitted following the PMRA's February 2014 monitoring data request for active ingredients under special review. Data submitted April 15, 2014. Banque de donnees sur la qualite du milieu aquatique (BQMA), Quebec, ministere du Developpement durable, de l'Environnnement, de la Faune et des Parcs. Direction du suivi de l'etat de l'environnement, DACO: 8.6
2424839	Part 1: Environment Canada. 2007. Surveillance of Pesticide Residues in Surface Water in an Intensive Agricultural Region of Northwestern New Brunswick - 2006. Internal Monitoring Project Report. A Cooperative Project by Environment Canada, Agriculture and Agri-Food Canada and the New Brunswick Department of Environment and Local Governments. A Pesticides Science Fund Project. December 2007., DACO: 8.6

PMRA Number	Reference
2424841	Part 2: Environment Canada. 2007. Surveillance of Pesticide Residues in Surface Water in an Intensive Agricultural Region of Northwestern New Brunswick - 2006. Internal Monitoring Project Report. A Cooperative Project by Environment Canada, Agriculture and Agri-Food Canada and the New Brunswick Department of Environment and Local Governments. A Pesticides Science Fund Project. December 2007., DACO: 8.6
2424873	Saskatchewan Water Security Agency.2014. Water monitoring data on 2,4-D submitted following the PMRA's April 2014 monitoring data request for active ingredients under special review. Data submitted May 1, 2014. Government of Saskatchewan., DACO: 8.6
2428526	Challenges 5:138-151, Todd, A. and J. Struger. 2014. Unpublished supplemental information to the published article: Changes in acid herbicide concentrations in urban streams after a cosmetic pesticides ban. Challenges 5:138-151, DACO: 8.6
2430948	Ontario Ministry of the Environment and Ontario Ministry of Agriculture. 2014. Water monitoring data on 2,4-D in surface water from Ontario submitted following the PMRA's April 2014 monitoring data request for active ingredients under special review. Data submitted May 29, 2014., DACO: 8.6
2430952	Ontario Ministry of the Environment. 2014. Water monitoring data on 2,4-D in groundwater from the Ontario Provincial Groundwater Monitoring Network submitted following the PMRA's April 2014 monitoring data request for active ingredients under special review. Data submitted May 29, 2014., DACO: 8.6
2430953	Ontario Ministry of the Environment. 2014. Water monitoring data on 2,4-D in Ontario urban streams submitted following the PMRA's April 2014 monitoring data request for active ingredients under special review. Data submitted May 29, 2014., DACO: 8.6
2430958	Government of British Columbia. 2014. Responses from the Government of British Columbia following the PMRA's April 2014 request for monitoring data request for active ingredients under special review. Monitoring information on 2,4-D received May 28, 2014, DACO: 8.6
2462785	Ontario Ministry of the Environment and Climate Change. 2014. Monitoring data on 2.4-D in Ontario raw water and treated drinking water. Submitted following the PMRA's April 2014 monitoring data request for active ingredients under special review. Data submitted September 19, 2014., DACO: 8.6
2483901	Water Quality Management Section, Manitoba Conservation and Water Stewardship. 2014. Monitoring data for 2,4-D received following the PMRA's December 2014 request for monitoring data for active ingredients under special review. 123 Main Street, Suite 160, Winnipeg MB R3C 1A5, Data received December 15, 2014, DACO: 8.6
2505509	California Department of Pesticide Regulation. 2015. Surface Water Protection Program data for 2,4-D. Downloaded on February 12, 2015. https://www.google.com/fusiontables/DataSource?snapid=S954602gmYX, DACO: 8.6
2509897	United States Geological Survey. 2015. USGS National Water Quality Assessment (NAWQA) program water monitoring for 2,4-D, form 2002 to 2015. Downloaded March 6, 2015. http://water.usgs.gov/nawqa/ DACO: 8.6
2509899	United States Environmental Protection Agency. 2015. Monitoring data for 2,4-D in water from 2002 to 2015 downloaded from the US EPA Storage and Retrieval (STORET) data warehouse on February 19, 2015. http://ofmpub.epa.gov/storpubl/dw_pages.querycriteria, DACO: 8.6